

CLAIMS:

1. A level detector comprising:

a transparent housing;

5 a plurality of light emitting devices in the housing arranged along a direction which is substantially upright in use of the detector; and

a plurality of light receiving devices in the housing and also arranged along said direction, each light receiving device being operable to receive light from at least one light emitting device which has been internally reflected by the housing in dependence on the refractive index of the fluid
10 surrounding the housing;

whereby the extent of immersion of the level detector within a liquid can be determined from the outputs of the light receiving devices; and

wherein each light receiving device can receive light emitted by each of two adjacent light emitting devices and internally reflected by the housing.
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2. A level detector comprising:

a transparent housing;

a plurality of light emitting devices in the housing arranged along a direction which is substantially upright in use of the detector; and
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a plurality of light receiving devices in the housing and also arranged along said direction, each light receiving device being operable to receive light from at least one light emitting device which has been internally

reflected by the housing in dependence on the refractive index of the fluid surrounding the housing;

whereby the extent of immersion of the level detector within a liquid can be determined from the outputs of the light receiving devices; and

5 wherein each light emitting device can illuminate each of two adjacent light receiving devices by means of light which is internally reflected by the housing.

3. A level detector as claimed in claim 2, wherein each light
10 receiving device can receive light emitted by each of two adjacent light emitting devices and internally reflected by the housing.

4. A level detector comprising:

a transparent housing;

15 a plurality of light emitting devices in the housing arranged along a direction which is substantially upright in use of the detector;

a plurality of light receiving devices in the housing and also arranged along said direction, each light receiving device being operable to receive light from at least one light emitting device which has been internally
20 reflected by the housing in dependence on the refractive index of the fluid surrounding the housing; and

a shift register circuit for selectively operating the respective light emitting devices;

whereby the extent of immersion of the level detector within a liquid can be determined from the outputs of the light receiving devices;

5 5. A level detector as claimed claim 4, wherein the shift register circuit is further operable for selectively enabling the light receiving devices.

6. A level detector as claimed in claim 4 or 5, wherein at least part of said shift register and at least some of said light receiving devices and light emitting devices are formed of circuit structures which are substantially
10 identical and connected end-to-end.

7. A level detector comprising:
a transparent housing;
a plurality of light emitting devices in the housing arranged along a
15 direction which is substantially upright in use of the detector;

a plurality of light receiving devices in the housing and also arranged along said direction, each light receiving device being operable to receive light from at least one light emitting device which has been internally reflected by the housing in dependence on the refractive index of the fluid
20 surrounding the housing;

whereby the extent of immersion of the level detector within a liquid can be determined from the outputs of the light receiving devices; and

a control circuit for deriving a reading from a light emitting device, the reading being dependent upon the relationship between an ambient measurement taken when no light emitting device is illuminating the light receiving device and an operational measurement taken when a light emitting
5 device capable of illuminating the light receiving device is operating.

8. A level detector comprising:

a transparent housing;

a plurality of light emitting devices in the housing arranged along a
10 direction which is substantially upright in use of the detector;

a plurality of light receiving devices in the housing and also arranged along said direction, each light receiving device being operable to receive light from at least one light emitting device which has been internally reflected by the housing in dependence on the refractive index of the fluid
15 surrounding the housing;

whereby the extent of immersion of the level detector within a liquid can be determined from the outputs of the light receiving devices; and

a control circuit comprising a memory storing calibration data, the calibration data comprising values associated with respective light emitting
20 devices and/or light receiving devices and/or light paths between emitting and receiving devices, and means operable to determine whether respective parts of the level sensor are immersed in dependence upon the outputs from the emitters and associated calibration data.

9. A level detector as claimed in claim 8, wherein the calibration data comprises at least one value for each light path and associated emitting device and receiving device.

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10. A level detector as claimed in claim 8 or 9, wherein the control circuit is operable for deriving a reading from a light emitting device, the reading being dependent upon the relationship between an ambient measurement taken when no light emitting device is illuminating the light receiving device and an operational measurement taken when a light emitting device capable of illuminating the light receiving device is operating.

11. A level detector as claimed in claim 10, the control circuit being operable to determine, using calibration data, an ambient reading and an operational reading, whether a respective part of a level sensor is one of at least (a) fully immersed, (b) partially immersed or (c) not immersed in the liquid.

12. A level detector as claimed in claim 10 or 11, the control circuit being operable to determine, using calibration data, an ambient reading and an operational reading, whether a respective part of a level sensor is dirty.

13. A level detector comprising:

a transparent housing;

a plurality of light emitting devices in the housing arranged along a direction which is substantially upright in use of the detector;

a plurality of light receiving devices in the housing and also arranged
5 along said direction, each light receiving device being operable to receive light from at least one light emitting device which has been internally reflected by the housing in dependence on the refractive index of the fluid surrounding the housing; and

a control circuit operable to determine, from the outputs of the light
10 receiving devices, the extent of immersion of the level detector within a liquid by locating the highest sensor whose output indicates immersion and checking that at least one lower sensor also has an output indicating immersion.

14. A level detector as claimed in claim 1, wherein the housing has
15 an internally-reflecting surface which is substantially continuous and straight along said direction.

15. A level detector as claimed in claim 13, wherein the outer
profile of the housing, when considered transverse to said direction, is
20 substantially uniform throughout the distance over which level sensing takes place.